

We claim:

- [C1] A fluid level gauge for sensing the level of fluid in a dispenser, comprising:  
an inlet port in communication with the fluid;  
a check valve and communication with the inlet port, said check valve I  
including a membrane, the membrane allowing air to pass;  
a pressure sensor in fluid communication with the check value.
- [C2] The fluid level gauge of claim 1, where the membrane is a non-woven polyester membrane.
- [C3] The fluid level gauge of claim 1, further including a display for displaying indicia related to the level of fluid sensed, said display electrically connected to the pressure sensor.
- [C4] The fluid level gauge of claim 3, further including a timer circuit electrically connected to a display to indicate the expiration of a pre-determined time period.
- [C5] The fluid level gauge of claim 4, wherein said timer circuit is reset upon removal of pressure and replacement of pressure, as sensed by the sensor.
- [C6] The fluid level gauge of claim 1, further including means for calibrating the gauge.
- [C7] The fluid level gauge of claim 3, further including means for eliminating a sudden drop in a level indicia on the display.
- [C8] A fluid level gauge for a beverage dispenser including:  
a first tube in communication with the beverage dispenser at a first end, and in communication with a check valve at a second end;  
a second tube in communication with the check valve at a first end, and in communication with a pressure sensor at a second end;  
the check valve including a membrane positioned to limit communication between the first tube and the second tube; and  
a display for indicating the level of fluid in the beverage dispenser, the display electrically connected to the sensor.
- [C9] The fluid level gauge of claim 8, where the membrane is a non-woven polyester membrane.
- [C10] The fluid level gauge of claim 8, further including timing means electrically connected to a display to indicate the expiration of a pre-determined time period.
- [C11] The fluid level gauge of claim 8, further including a microprocessor electrically connected between the display and the pressure sensor.

- [C12]           The fluid level gauge of claim 8, further including means for processing signals generated by the sensor, the means for processing also providing a signal to the display, said signal related to the level of fluid in the dispenser.
- [C13]           The fluid level gauge of claim 11, further including the microprocessor processing signals from the pressure sensor and providing a signal to the display to indicate the level of fluid in the dispenser.
- [C14]           The fluid level gauge of claim 13, wherein in the microprocessor monitors the signals from the pressure sensor, determines that the level in the dispenser has not increased for predetermined amount of time, and provides a response signal to a display.
- [C15]           The fluid level gauge of claim 14, further including means to adjust the predetermined time.
- [C16]           The fluid level gauge of claim 14, wherein the microprocessor further monitors the pressure sensor and determines if the level in the dispenser has not increased for a second predetermined time, and provides a signal to activate an alarm.
- [C17]           The fluid level gauge of claim 16, where the alarm is a visual indicator.
- [C18]           The fluid level gauge of claim 16, where the alarm is an audio indicator.
- [C19]           The fluid level gauge as claimed in claim 11, wherein the microprocessor powers down the pressure sensor for a predetermined time, and reapplies power after a predetermined time passes.
- [C20]           The fluid level gauge of claim 11, further including a signal conditioning circuit electrically connected between the pressure sensor and microprocessor.
- [C21]           A method of determining the level of a fluid in a beverage dispenser, including:
  - providing a pressure sensor to sense the pressure produced by the fluid in the dispenser,
  - the pressure sensor producing a signal related to the pressure;
  - providing means to process the signal produced by the pressure sensor and generate a signal for driving a display; and
  - providing display for receiving the signal from the means to process, and displaying the level of fluid in the beverage dispenser.
- [C22]           The method of claim 21, wherein upon expiration of a set time period of a freshness timer, generating an indication of the expiration.
- [C23]           The method of claim 22, wherein said indication appears on a visual display.

- [C24]** The method of claim 22, wherein said indication is produced as an audio signal.
- [C25]** A method of providing an indication of the level of a fluid in a beverage dispenser, including the steps of:
- placing an enclosed column of air in communication with the beverage in the dispenser, so as to place the air under the pressure of the beverage;
  - placing a pressure sensor in communication with the column of air, the sensor producing a signal related to the air pressure; and
  - communicating the signal to a display, the display indicating the level of fluid in the dispenser.
- [C26]** The method of claim 25, further including the steps of determining if the beverage dispenser received additional beverage, and resetting the freshness timer if additional beverage has been added to the beverage dispenser.
- [C27]** The method of claim 26, further including the step of providing indicia to a user when the freshness timer expires.
- [C28]** The method of claim 25, further including the steps of:
- determining if the dispenser is dispensing beverage; and
  - displaying indicia related to a decreasing beverage level.
- [C29]** The method of claim 28, whereby the indicia is produced by a flow rate timer, a decrease in the displayed indicia being related to the time the beverage is dispensed.
- [C30]** A method of providing an indication of beverage level in a beverage dispenser including:
- providing a pressure sensor placed to sense the pressure generated by the beverage, the sensor providing a signal related to the pressure;
  - providing a microcontroller to electrically connect the pressure sensor to a display for presenting indicia related to the level of the beverage, and to drive the display; and
  - providing a source of electric power to the microcontroller, the microcontroller disconnecting power to the pressure sensor and reconnecting power to the pressure sensor.
- [C31]** The method of claim 30, further including the step of:
- calibrating the microcontroller for a particular size beverage dispenser.
- [C32]** The method of claim 30, further including the step of:

when a beverage is dispensed, decrementing the indicia displayed in the display at a rate related to the flow rate of the beverage.

- [C33]** The method of claim 30, further including the steps of:  
determining if the pressure sensed by the pressure sensor has increased during a predetermined time; and  
displaying an indicia to the user if the pressure has not increased.

- [C34]** An apparatus for displaying the level of fluid in a beverage dispenser, including:

a battery;  
a voltage regulator electrically connected to the battery;  
a microcontroller electrically connected to draw power from the voltage regulator;  
a display electrically connected to the microcontroller;  
an oscillator electrically connected to the microcontroller;  
a pressure sensor electrically connected to the microcontroller, said sensor providing a signal related to the pressure sensed by the sensor; and  
a conduit in fluid communication with the beverage to be dispensed, said pressure sensor operably connected to the conduit so as to sense the pressure therein.

- [C35]** The apparatus of claim 34, further including an operational amplifier filter, electrically connected between the microcontroller and the pressure sensor.

- [C36]** The apparatus of claim 34, further including an analog to digital converter electrically connected to receive analog signals from the sensor and deliver digital signals to the microcontroller.

- [C37]** The apparatus of claim 34, further including a membrane located in the conduit, and positioned to limit the communication of beverage within the conduit.

- [C38]** The apparatus of claim 34, further including a re-settable timer, said timer starting when the beverage level in the dispenser increases.

- [C39]** The apparatus of claim 38, including a timer and a display, said display displaying indicia upon expiration of the timer.

- [C40]** The apparatus of claim 34, whereby said microprocessor monitors the signal from the pressure sensor, and upon detecting a decrease in the pressure sensed by the pressure sensor, the microcontroller sends a signal to the display, causing the display to display indicia relating to a decreasing level beverage in the dispenser.

**[C41]**        The apparatus in claim 34, further including a timer to decrement a level indicated on the display upon the sensing of a pressure drop by the pressure sensor.